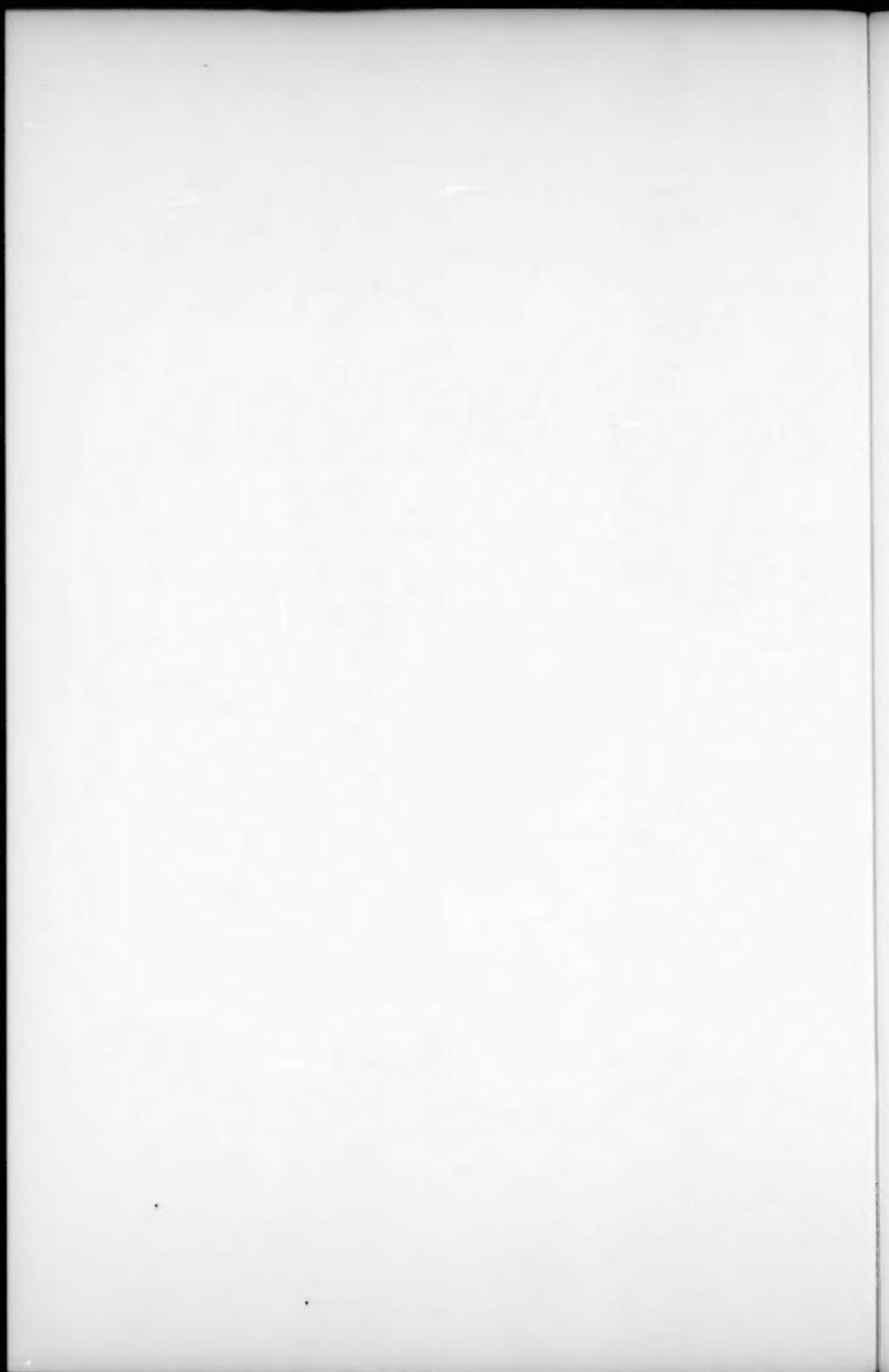


## **AUTHOR INDEX**

- Coll, H., 541  
Fava, R. A., 1  
Fujii, K., 431  
Ghosh, P., 195  
Kurihara, M., 109  
Noren, G. K., 385  
Stille, J. K., 385  
Turner, D. T., 229  
Yoda, N., 109



## SUBJECT INDEX

Acetalization of PVA, 493  
Axialites, 44

Boric acid  
reaction of —— with poly(vinyl alcohol), 500  
Branching of poly(vinyl alcohol)  
long branching of poly(vinyl alcohol), 528  
short branching of poly(vinyl alcohol), 530  
 $\beta$ -butyraldehyde sulfonic acid  
reaction of —— with poly(vinyl alcohol), 501

Cage effect on chain fracture, 316  
Cellulose  
accumulation of products from  
irradiated ——, 301  
G(F), G(free radical), 305  
yields of products in photolysis and  
radiolysis, 361  
Chain transfer in vinyl acetate  
polymerization, 529  
Coloration  
of poly(vinyl alcohol) with iodine, 514, 523  
Copolymerization of sulfur chlorides  
with diolefins, 213  
Cross-linking in irradiated polymers, 281  
correlation with elastic modulus, 292  
G(X) value, 282, 296, 299, 305  
gel-sol ratio, 288  
influence of dose, 321  
influence of dose rate, 322  
influence of physical state, 314  
influence of temperature, 308  
stoichiometry of, 292

Crystal  
extended chain, 78  
folded chain, 9  
growth, 66  
growth rate, 70  
lamellae, 9  
metastability, 75  
ribbon-like lamellae, 44  
single —— of polyethylene, 9  
of poly(vinyl alcohol), 451, 508  
of poly(vinyl formate), 463  
thickness, 71

twisting of ——, 50  
virus ——, 4  
Crystal growth  
dendritic, 9, 24, 43  
epitaxial, 27  
instability of —— front, 47  
Crystallinity  
from density, 33  
from heat of fusion, 33  
of polyphenylene, 416  
water resistance and tacticity of  
poly(vinyl alcohol), 502  
X-ray determination of, 33  
Cyclopolycondensation reactions, 116

DNA  
fracture resulting from irradiation, 286  
Dehydrogenation of poly(1,3-cyclohexadienes), 388  
Dendrites, 43  
Density  
amorphous polyethylene, 33  
crystalline polyethylene, 33  
of poly(vinyl formate) as function of  
tacticity, 460  
Diazothioether  
as polymerization initiator, 198  
Diels-Alder polymerization  
for preparation of polyphenylene, 404  
Dimethyl sulfoxide  
as polymerization solvent and initiator, 211  
Divinyl monomers as the starting monomer for preparation of PVA, 442  
divinyl acetals, 443  
divinyl carbonate, 444  
divinyloxydimethylsilane, 446

Electrical conductivity of irradiated  
polymer, 245  
electrical conductivity of polyphenylene,  
418  
Electron spin resonance of irradiated  
polymer, 248  
of free radicals, 253  
of radical ions, 252  
Elemental sulfur  
as initiator and/or modifier of  
polymerization, 204

- Esterification of poly(vinyl alcohol), 499
- Fibers of poly(vinyl acetate), 520
- Fibrils, 46
- Fold period, 68, 75  
fluctuation of ——, 73
- Fold surface, 15  
lattice interaction, 23
- Fractionation by crystallization, 79  
by foaming, 517
- Fringed micelle, 5
- Fuming nitric acid etching, 35, 51
- G-values  
derivation from the sol fraction, 288  
for chain fracture G(F), 282, 296, 300, 305  
for cross-linking G(X), 282, 292, 296, 299, 305  
for radical formation G(free radicals), 304  
of escaped electrons in polymers, 246
- Gases influence on disappearance of radicals, 279
- Gelation (see also network formation)  
of aqueous solution of poly(vinyl alcohol), 513
- Glass temperature of poly(vinyl alcohol), 511
- Hydrogen sulfide  
as initiator and/or modifier of polymerization, 209
- Hydrolysis of poly(vinyl acetal), 491  
of poly(vinyl acetate), 496
- IR spectra  
of poly(vinyl acetate), 486  
of poly(vinyl alcohol), 478  
of poly(vinyl formal), 490  
of poly(vinyl formate), 486  
of poly(vinyl trifluoroacetate), 490
- Intermediates formed in irradiated material  
chemistry of ——, 356  
detection and estimation, 244  
formation and distribution, 235  
primary (radical ions, electrons, excited molecules), 230
- scavenging of, 328  
secondary —— (free radicals), 230
- Ionization phenomena in irradiated gases, 235
- in polymers, 243  
in water, 240
- Irradiation effects in polymers, 230  
influence of dose, 321  
influence of dose rate, 322  
influence of physical state on, 314  
influence of linear energy transfer, 326, 235
- Irradiation effects of  $\alpha$  particles, 326  
— of neutrons, 326
- Linear energy transfer in irradiated polymer, 326
- Mechanical denaturation of aqueous solutions of poly(vinyl alcohol), 518
- Polymerization mechanism of —— of 4,4'-diamino-3,3'-biphenyldicarboxylic acid, 158  
NMR evidence for salt formation during ——, 163  
NMR evidence for protonation of the amino group during ——, 164  
solid state —— of vinyl formate, 461
- Melting dissolution states of ——, 85  
effect of heating rate on ——, 95  
effect of irradiation on ——, 98  
— point and tacticity of poly(vinyl alcohol), 511  
— point of single crystals of poly(vinyl alcohol), 508  
premelting, 84  
stages during melting on a substrate, 87  
superheating effects in ——, 83  
true —— point, 94
- Membrane, 553  
ballooning of ——, 550  
cellulosic ——, 554  
porous glass ——, 554  
performance of commercial ——, 555  
permeation limit of ——, 554  
reflection coefficient of ——, 560  
selection coefficient of ——, 560  
transport through ——, 557
- Metal catalyzed coupling reactions for preparation of polyphenylene, 399
- Mobility of radicals, 275  
in glasses and crystals, 275  
in polyethylene, 277, 279  
in polyethylene terephthalate, 277, 278  
in polymethyl methacrylate, 276

- Model compounds  
low molecular weight — for PVA,  
447
- Model reactions for heterocycle formation,  
118
- Molecular fracture in irradiated polymers,  
281  
G(F) value, 282, 296, 305  
influence of dose, 321  
influence of dose rate, 322  
influence of physical state, 314  
influence of temperature, 308  
of side substituents and main chain, 354  
— and reduction of elastic modulus,  
291
- soluble products as consequence of  
—, 284  
stochiometry of —, 300
- Monomer  
starting — for preparation of  
poly(vinyl alcohol), 433, 447  
use of — before or after irradiation,  
352
- Morphology  
lamellar, 10  
of heat treated crystals, 85
- NMR spectra, high resolution  
of poly(vinyl acetate), 467  
of poly(vinyl alcohol), 471  
of poly(vinyl formal), 476  
of poly(vinyl formate), 476  
of poly(vinyl trifluoroacetate), 473
- Natural rubber (*cis* 14 polyisoprene)  
accumulation of products from  
irradiated —, 301  
G(X) and G(F) for irradiated —, 296  
influence of additives on network  
formation in irradiated —, 336  
solubility changes by irradiation, 312
- Network  
characterization of —, 288  
derivation of G(X) and G(F) from the  
sol fraction, 283  
— formation in irradiated polymer,  
287  
influence of additives on network  
formation, 336
- Nucleation  
primary —, 63  
row —, 53  
secondary —, 66
- Organic sulfides  
as initiators and/or modifiers of  
polymerization, 205
- Organic sulfoxide compounds  
as polymerization initiators, 198
- Osmodialysis, 578
- Osmometer  
automatic, 547  
concentration profile in the —, 552  
dynamic —, 547  
high speed recording —, 547  
nonideal —, 551  
one-cell —, 544  
two-cell —, 544
- Osmometry  
diffusion theory of —, 567  
experimental results of —, 512  
flow equations in —, 557  
nonequilibrium —, 541  
— of association colloids (micelles),  
582  
— of surfactants, 582  
theory of —, 557
- Osmotic pressure  
dynamic method of — measurement,  
546  
high speed recording of —, 547  
measurement of —, 544  
static method of — measurement, 544  
time dependence of —, 545, 562, 584,  
565, 569, 573, 580
- 1,3,4-Oxadiazoles, 140
- Oxidative cationic polymerization of  
phenylene, 387
- Paracrystalline structure, 39
- Peroxy sulfur compounds  
as polymerization initiators, 196
- Photochemistry of intermediates, 357  
influence of inert gas, 365  
photolysis of free radicals, 360  
reactions of hydrogen atoms, 365  
role of low energy states, 358
- Photolysis of free radicals, 360  
comparison with radiolysis in cellulose,  
361
- Polyamic acid  
thermal stability of —, 125
- Polyamides  
accumulation of radicals in irradiated  
—, 265
- Polyaromatic heterocycles, 117
- Poly(benzimidazoquinazolines), 178  
Poly(benzimidodobenzophenanthrolines),  
170
- Poly(benzimidazoquinazolones), 182
- Polybenzoxazinones, 119, 120  
polymerization of —, 121  
solution polymerization of —, 122  
thermal stability of —, 125

- Polybenzoxazoles, 149  
 Poly(dimethyl siloxane)  
     free radicals in irradiated —, 257  
     G(F), G(free radical) —, 305  
     influence of additives on network formation in irradiated —, 341  
     yield of products of irradiated —, 311  
 Polyethylene  
     accumulation of radicals, 260  
     alkyl radical disappearance in, 270, 273  
     — allyl radicals, 266, 273  
     changes of ESR spectra of irradiated on UV exposure, 363  
     changes in unsaturation on irradiation, 295  
     ESR spectra of irradiated, 253  
     G(X), G(free radical), 305  
     influence of additives on network formation in irradiated —, 342  
     influence of dose rate on optical density of —, 325  
     sol-gel ratio of irradiated —, 288, 317  
     trapped electrons, 252  
     UV absorption bands assigned to free radicals, 259  
     yield of products of irradiated —, 310  
 Polyethylene crystals, 2, 9-15  
     dislocation network, 30, 38  
     extended chain —, 55  
     hollow pyramids, 17  
     lozenges, 16  
     Moiré pattern, 25  
     multilayer —, 23  
     whiskers, 54  
 Polyethylene oxide  
     crystals, 78  
 Polyethylene terephthalate  
     accumulation of radicals in irradiated —, 265  
     crystal thickness, 78  
     ESR spectra of irradiated —, 255  
     influence of dose rate on optical density of —, 323, 324  
     surface morphology of —, 7  
     yields of products, cross-links, and fracture for different types of radiation, 359  
 Poly(imidazopyrrolones), 169  
 Polyindolones, 119, 156  
 Poly(indoloquinolines), 184  
 Polyindoxyls, 119, 157  
 Poly(isobutenes)  
     change in viscosity of irradiated —, 313  
     fracture of side substituents and main chain, 355  
     G(radical) of — in the presence of styrene, 353  
     influence of additives on network formation in irradiated —, 346  
 Poly(isoindolaquinazoline diones), 176  
 Polymerization conditions  
     effect of — of vinyl acetate on properties of derived poly(vinyl alcohol), 521  
 Poly(methyl methacrylate)  
     accumulation of products from irradiated —, 302  
     accumulation of radicals in irradiated —, 265  
     free radicals in — irradiated —, 257  
     G(F), G(free radical), 287, 305  
     influence of additives on network formation in irradiated —, 344  
 Poly-4-methyl pentene, 1  
     crystals, 12  
 Polyoxymethylene  
     crystals, 12, 28  
     shish-kebabs, 53  
 Poly-4-phenyl-1,2,4-triazoles, 145  
 Polyphenylenes, 385  
     crystallinity, 416  
     miscellaneous reactions and uses of —, 424  
     radiation stability, 419  
     semiconducting properties, 418  
     solubility and solution properties, 417  
     synthesis by Diels-Alder polymerization, 404  
     synthesis by dehydrogenation of poly(1,3-cyclohexadiene), 398  
     synthesis by metal catalyzed coupling reactions, 399  
     synthesis by miscellaneous methods, 406  
     synthesis by oxidative — cationic polymerization, 388  
     thermal stability, 420  
 Polyphosphoric acid, 110  
     application of — in polymeric reactions, 117  
     constitution of, 113  
     double cyclization polymers obtained by — solution polymerization, 168  
     mechanism of polymerization in —, 158  
 Poly-p-xylylene  
     crystals of —, 13  
 Propylene  
     crystals, 12  
     free radicals in irradiated —, 256  
     radical conversion by UV irradiation, 364  
 Poly(pyrimidinetetrayls), 172  
 Poly(quinolines), 185  
 Poly(quinoxalines), 174

- Poly(quinolinethiazine oxazines),** 186  
**Poly(quinazolinoquinazolones),** 183  
**Polyquinazolones,** 119, 120, 152  
**Polystyrene**  
 free radicals in irradiated —, 257  
 G(X), G(free radical), 305  
 G(X) and G(H<sub>2</sub>), 299  
 irradiation in nuclear reactor, 327  
 sedimentation of irradiated —, 285  
**Poly(tetrafluoroethylene)**  
 free radicals in irradiated, 256  
**Polyurea acid**  
 properties, 133  
**Polyquinazolinediones,** 127  
 cyclodehydration, 129  
 polycondensation, 129  
 properties, 133  
**Poly(vinyl acetal)**  
 hydrolysis of —, 491  
**Poly(vinyl acetate),** 457  
 hydrolysis of —, 496  
 IR spectrum, 486  
 NMR spectrum, 467  
**Poly(vinyl acetocetal)**  
 IR spectrum, 490  
**Poly(vinyl alcohol),** 432  
 preparation of stereoregular —  
 — from divinyl monomers, 442  
 — from vinyl esters, 439  
 — from vinyl ethers, 433  
 structural irregularities of —, 527  
 IR spectrum of —, 478  
 low molecular weight model  
 compounds, 447  
 microtacticity and acetalization of  
 —, 493  
 microtacticity and chemical  
 reactions of —, 490  
 microtacticity and esterification of  
 —, 499  
 NMR spectrum of —, 471  
 stereoregularity and crystallibility  
 of —, 449  
 tacticity and physical properties of  
 —, 501  
 tacticity and solid properties of  
 —, 501  
 tacticity and solution properties of  
 —, 513  
**Poly(vinyl formal)**  
 IR spectrum, 490  
 NMR spectrum, 476  
**Poly(vinyl formate),** 457  
 IR spectrum, 486  
 NMR spectrum, 476  
**Poly(vinyl trifluoroacetate),** 464  
 IR spectrum, 490  
 NMR spectrum, 473  
**Radicals**  
 accumulation of —, 260  
 back reactions with hydrogen atoms,  
 261  
 conversion by UV irradiation, 363  
 disappearance of —, 268  
 kinetics of —, 210  
 free —, 253  
 G(free radicals), 304, 352  
 ion —, 252  
 migration, 275  
 motion in the matrix, 275  
 overlapping of spurs, 263  
 polyethylene allyl —, 266  
 reactions, 331  
 resetting at random, 264  
 scavenging of —, 328  
 UV absorption bands in irradiated  
 polymers, 250  
**Reactions in irradiated polymer**  
 fracture of main chain, 354  
 fracture of side substituents, 354  
 fractures and cross-links, 281  
 molecular —, 331  
 photochemistry of radicals, 331  
**Reflection coefficient of membrane,** 560,  
 570  
 (Staverman coefficient)  
**Salts of reducing sulfoxyl compounds**  
 as polymerization initiators, 202  
**Scavengers of intermediates**  
 in natural rubber, 336  
 in polydimethylsiloxane, 341  
 in polyethylene, 342  
 in polymethyl methacrylate, 344  
 in polyisobutene, 346  
 use of — for determination of  
 G(radical), 330  
**Scavenging of intermediates in irradiated**  
 polymer, 328  
 scavenging of free radicals, 328  
**Self polymerization of aromatic**  
 dicarboxylic acids  
 mechanism of, 168  
**Shish-kebabs,** 51  
**Solubility of polyphenylene,** 417  
**Solutes**  
 effect of polydispersity of — on  
 osmotic pressure, 546  
 flow of — through membrane, 557  
 multicomponent —, 578  
 — permeation and molecular weight,  
 576  
 single component —, 572  
**Solution properties of polyphenylene,** 417  
 solution properties of  
 poly(vinyl alcohol), 513

- Solvent**  
 effect of dielectric constant of —— on polymer, 526  
 effect of polar —— on the stereoregularity, 437  
 effect of —— on properties of derived polymer, 524
- Spectroscopy of irradiated polymer**, 258  
**spectroscopy of polyphenylene**, 412
- Spherulites**, 7  
 evolution of ——, 39  
 fibril ——, 41  
 —— grown from solution, 46  
 —— of poly(vinyl alcohol), 507  
 —— nucleus, 41  
 ribbon, 43
- Spiropolyimides**, 188
- Spurs**, 235  
 formation, 239  
 overlapping of ——, 263  
 radical disappearance in ——, 271
- Stability**  
 of aqueous DMSO solutions of poly(vinyl alcohol), 517  
 radiation —— of polyphenylene, 420  
 thermal —— of polyamic acid, 125  
 thermal —— of polyphenylene, 419
- Steric conformation of poly(vinyl alcohol)**, 519
- Structure**  
 1,2-glycol structure in poly(vinyl alcohol), 527  
 —— and properties of poly(vinyl alcohol) derived from vinyl acetate, 521  
 crystal —— of polyethylene, 3  
 crystal —— of poly(vinyl alcohol), 501
- Sulfonyl azides as polymerization initiator**, 198
- Sulfoxo groups in the repeating unit of polymers**, 223
- Sulfur compounds**  
 as polymerization initiators, 196  
 as polymerization initiators and modifiers, 204  
 as polymerization solvent and initiator, 211
- Sulfur dioxide**  
 participation of —— in polymerization, 213
- Sulfuric acid**  
 as polymerization initiator, 200
- Sulfuryl chloride**  
 as polymerization initiator, 202
- Surface**  
 amorphous —— layers, 35  
 —— disorder, 31, 36  
 fold ——, 15, 36  
 gold decoration of ——, 31  
 —— morphology, 6
- Surfactants**  
 osmometry of ——, 582
- Swelling**  
 of poly(vinyl alcohol), 522
- Crystallization**  
 —— during polymerization, 61  
 fractionation during ——, 79  
 —— from dilute solution, 34, 43  
 —— from melt, 39  
 —— from stirred or sonicated solution, 53  
 kinetic theory of ——, 63  
 mechanisms of ——, 62  
 oriented ——, 58  
 rate of ——, 68  
 —— theory, 69  
 —— under high pressure, 81  
 —— and tacticity, 449  
 —— of poly(vinyl alcohol) from solution, 508
- Tacticity (stereoregularity)**  
 —— and crystallizability, 449  
 —— and physical properties, 501  
 —— and solid properties, 501  
 —— and solution properties, 513  
 crystallinity, water resistance, and ——  
 of poly(vinyl alcohol), 502  
 —— estimated from reactivity, 496  
 —— of poly(vinyl acetate) 457  
 —— of poly(vinyl alcohol), 449  
 —— of poly(vinyl formate), 457  
 —— of poly(vinyl trifluoroacetate), 464
- Texture**  
 banded spherulitic ——, 8  
 granular ——, 5-7  
 lamellar ——, 39
- Thermogravimetric analysis of poly(vinyl alcohol)**, 520
- Thickening mechanisms**, 90
- Thiourea**  
 as polymerization initiator, 203
- Trans 1,4 polyisoprene**  
 solubility after irradiation of ——, 320
- Triphenylmethylation**, 500
- Unit cell**, 2  
 density of polyethylene ——, 26  
 density of poly(vinyl alcohol) ——, 502, 508  
 orthorhombic —— of polyethylene, 3
- Vinyl esters as the starting monomer for preparation of PVA**, 439
- Vinyl ethers as the starting monomers for preparation of PVA**, 433

- vinyl benzyl ether, 433  
vinyl t-butyl ether, 435  
vinyl trimethylsilyl ether, 438  
Viscoelasticity, dynamic  
of poly(vinyl alcohol), 513
- Water resistance  
and tacticity of poly(vinyl alcohol),  
502, 522
- X-ray diffraction pattern  
anisotropy of wide-angle —— of  
poly(vinyl alcohol film), 506  
small angle ——, 39, 71  
wide-angle —— of poly(vinyl alcohol),  
449  
wide-angle —— of poly(vinyl  
formate), 457  
wide-angle —— of poly-  
(vinyl trifluoroacetate), 464